

**AQUATIC WEEVILS (COLEOPTERA:
CURCULIONIDAE) ASSOCIATED
WITH NORTHERN WATERMILFOIL
(*MYRIOPHYLLUM SIBIRICUM*) IN
ALBERTA, CANADA¹**

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ABSTRACT: Eggs, larvae, pupae and adults of two aquatic weevils (*Euhrychiopsis* sp.³ and *Phytobius leucogaster*) were found associated with northern watermilfoil (*Myriophyllum sibiricum*) in the province of Alberta, Canada. While both weevils had been collected previously in Alberta, this is the first report to document northern watermilfoil as a native host.

The North American weevil *Euhrychiopsis lecontei* (Dietz) may be used for biological control of Eurasian watermilfoil (*Myriophyllum spicatum* L.) (Creed and Sheldon 1991a&b, 1992a&b), an introduced aquatic macrophyte which is a nuisance in lakes and ponds throughout much of North America (Aiken *et al.* 1979, Couch and Nelson 1986, Smith and Barko 1990). *E. lecontei* has been found associated with Eurasian watermilfoil in several lakes located in Vermont, Massachusetts, New York and Connecticut (Creed and Sheldon 1991a&b). Adult *E. lecontei* consume leaf and stem tissue. First instar larvae feed on meristems and older larvae burrow through the stem. Weevils damage the plants and may be responsible for some Eurasian watermilfoil declines in Vermont (Creed and Sheldon 1991a&b, 1992a&b, 1993a&b, Creed *et al.* 1992). Despite the interest in *E. lecontei* as a biological control agent, neither the identity of its native host (or hosts) nor its life history on its native host(s) are known. Blatchley and Leng (1916) report *Potamogeton* sp. and *Myriophyllum spicatum* as hosts. However, Blatchley and Leng incorrectly synonymized this weevil species with the palearctic weevil *Eubrychius velatus* (Beck) (Dr. Charles O'Brien,

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³ Currently, two species of *Euhrychiopsis*, *E. lecontei* and *E. albertanus* (Brown), are recognized in North America. However, Dr. Charles O'Brien (Florida A&M University) has examined the weevils we collected in Alberta and other specimens in his collection and believes that *E. lecontei* and *E. albertanus* may be a single species based on a lack of differentiation in male genitalia. Due to the present uncertainty in the taxonomic status of these two species we will simply refer to the weevils collected in Alberta as *Euhrychiopsis*. Please note that these two species are not being synonymized in this paper.

Florida A&M, pers. comm.). Since the host use information reported by Blatchley and Leng (1916) may be derived from European records of *E. velatus*, this information is questionable. More recently, Kissinger (1964) reported that one species of *Euhrychiopsis* lived on *M. spicatum*. Kangasniemi (1983) reported collecting *E. lecontei* on *M. spicatum* in British Columbia. The repeated collection of *E. lecontei* on the introduced *M. spicatum* suggests that the native host(s) might be one or more of the native watermilfoils.

We have collected *E. lecontei* from northern watermilfoil (*Myriophyllum sibiricum* Komarov (= *M. exalbescens* Fernald) in three lakes in Vermont. *M. spicatum* was also present in two of the three lakes so it was unclear if the weevils had been present on the northern watermilfoil when Eurasian watermilfoil invaded the lakes or if they had entered the lakes with Eurasian watermilfoil and had then begun to feed on the native watermilfoil which is morphologically similar to Eurasian watermilfoil (Aiken *et al.* 1979). To determine if northern watermilfoil is a native host, we collected weevils in Alberta, Canada, where both northern watermilfoil and the weevil are present but Eurasian watermilfoil is absent. Previous collections of *Euhrychiopsis* had been made in Alberta (Brown 1932, Kissinger 1964, O'Brien and Wibmer 1982) but the native host was not determined.

MATERIALS AND METHODS

Collections of weevils on northern watermilfoil were made in mid to late July of 1992. Weevils were usually collected from northern watermilfoil while snorkeling. Only lakes where the visibility exceeded 1 m were surveyed intensively by snorkeling. In very shallow water or in very turbid water bodies, collections were made by inspecting northern watermilfoil while wading. Lakes with extensive algal blooms that made visual collection impossible were not examined. Approximately 1 hr was spent examining northern watermilfoil in lakes where collecting was possible. While the primary goal of these collections was to obtain adult specimens, some eggs, larvae, and pupae were collected. The identity of the adult weevils was verified by Dr. Charles O'Brien of Florida A&M University and most of the specimens are now in his collection. The identity of eggs, larvae, and pupae was based on our field and laboratory observations of these life stages of *E. lecontei* and *Phytobius leucogaster* (Marshall) on *M. spicatum* and *M. sibiricum* in eastern North America.

RESULTS AND DISCUSSION

Adult *Euhrychiopsis* were found on *M. sibiricum* in 10 of the 13 lakes that were sampled (Table 1). *M. sibiricum* was present in all 13 lakes. *Euhrychiopsis* adults were always collected beneath the surface of the water. They were usually located near apical or lateral meristems although they were occasionally found further down the stem. *Euhrychiopsis* eggs, larvae and pupae were always found underwater on *M. sibiricum*. Eggs were found on northern watermilfoil in six of the lakes; larvae and pupae were each collected in two lakes (Table 1). Eggs were found on meristems. Only one egg was found per meristem on northern watermilfoil (n=16). This is unlike what we have observed for *E. lecontei* which may lay several eggs on a Eurasian watermilfoil meristem. No first instar *Euhrychiopsis* larvae were collected in Alberta but the presence of eggs on the meristems suggests that the first instar larvae of western *Euhrychiopsis* feed on northern watermilfoil meristems. Older larvae (n=4) were found burrowing in the stem well below the surface of the water. Pupae (n=2) were found inside the stem below the region burrowed by the larvae. The puparium consisted of a small chamber entirely within the stem with a sealed entrance hole. The location of western *Euhrychiopsis* eggs, larvae and pupae on *M. sibiricum* was the same as that observed for *E. lecontei* on *M. sibiricum* and *M. spicatum* in eastern North America (Creed and Sheldon 1991a, 1992a). It is highly likely that these eggs, larvae and pupae are those of *Euhrychiopsis* as all three life stages were collected in lakes in which *Euhrychiopsis* was the only adult weevil found on *M. sibiricum* (Table 1).

The weevil *Phytobius leucogaster* (Marshall) [= *Litodactylus griseomicans* (Schwarz) and *Litodactylus leucogaster* (Marshall)], a species with a holarctic distribution, was found on *M. sibiricum* in four of these lakes (Table 1). *Phytobius* adults (n=11) were found both above and below the surface of the water. All life stages were collected at Island Lake which was the only lake where large numbers of the *M. sibiricum* plants were flowering. Eggs (n=2) and larvae (n=2) were collected on *M. sibiricum* floral spikes above the water surface. Pupal chambers (n=8) were found on the stem a short distance below the floral spike and were either above or just below the water surface. The puparium consisted of a shallow excavation with a dark, translucent cover and was similar to that described by Buckingham and Bennett (1981). The locations of *Phytobius* eggs, larvae and pupae on northern watermilfoil were similar to the locations reported by Buckingham and Bennett (1981) for *Phytobius* on Eurasian watermilfoil. Hatch (1971) and Buckingham and Bennett (1981) speculated that a native watermilfoil

was the native host of *P. leucogaster*. Our observations confirm that *M. sibiricum* is one host for *P. leucogaster*. While this weevil may use other native macrophyte species as hosts, they have yet to be reported. Our observations and those of Buckingham and Bennett (1981) suggest that *Phytobius*, like *Euhrychiopsis*, may be a watermilfoil specialist.

Table 1. Lakes in which *Euhrychiopsis* and *Phytobius* were collected. E refers to the collection of eggs, L to larvae, P to pupae and A to adults. The numbers in parentheses following a letter refer to the number collected.

Lake	Location ¹	<i>Euhrychiopsis</i>	<i>Phytobius</i>
Winchell	T29,R5,W5	E(3),A(4)	
Pine	T26,R7,W5	E(4),L(1),A(6)	
Hofmann	T30,R5,W5	E(2),L(3),P(1),A(8)	A(2)
Newall	T17,R14,W4	*	
MacGregor	T16,R21,W4		
Narrow	T65,R24,W4	E(4),A(13)	
Long	T64,R25,W4	E(2),P(1),A(5)	
Island	T68,R24,W4	A(5)	E(1),L(2),P(8),A(4)
N. Buck	T66,R17,W4	A(1)	
Chump	T65,R17,W4	A(1)	
Lac la Biche	T68,R16,W4	*	A(4)
Beaver	T66,R13,W4	E(1),A(9)	A(1)
Hasse	T52,R2,W5	A(1) #	

¹ Locations are given with respect to the Townships (T), Ranges (R) and Meridians (e.g., W4) used on the Alberta Transportation Maps (1:250,000 series) which are distributed by Maps Alberta.

* previously collected at this site by John Carr.

identified but not collected.

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